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| 10/587,147 | 07/24/2006 | Ryosuke Nishida | 2006_1143A | 4981 |

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| EXAMINER | |
|---|---|
| CORDRAY, DENNIS R | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1741 | |

| NOTIFICATION DATE | DELIVERY MODE |
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| 12/27/2010 | ELECTRONIC |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/587,147 | NISHIDA ET AL. | |
| | Examiner | Art Unit | |
| | DENNIS CORDRAY | 1741 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *14 May 2010 and 07 June 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1 and 4-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 4-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Petition Decision*

Applicant's petition for a new Office Action, filed 6/7/2010, has been granted. Accordingly, the Non-final Office Action mailed 5/21/2010 is withdrawn and a new Non-final Office Action presented as detailed herein. The time period for response is reset.

### *Declaration*

Applicant's Declaration under 37 CFR 1.132, filed 6/7/2010 with the aforementioned petition, has been fully considered but is not persuasive.

In the Declaration, Applicant argues that the reference Nishida et al '265 fails to provide motive to use water having as few non-potassium cations as possible when making the moisture-absorptive and desorptive paper which comprises the moisture-absorptive and desorptive polymer. The following reasoning is presented:

Nishida et al '265 and Lorah et al do not take into account the fact that cations exist in water used for making said paper and have no interest in the existence of cations.

Applicant admits that Nishida et al '265 states that "...the best result is available when all carboxyl groups contained in the polymer are changed to potassium type." How, Applicant argues that the lines immediately following the above statement disclose that carboxyl groups having other (cationic) counterions may exist upon necessity and that the ratio of potassium ions to other ions is preferably 40% or more, more preferably 60% or more. Applicant reads this broader disclosure as referring to intentional co-use

of cations other than potassium, and that the use of all carboxyl groups changed to potassium type refers to considerations when designing the polymer. Applicant also argues that Nishida et al '265 fails to suggest that the moisture absorbing and desorbing properties of the paper is greatly influenced by minor amounts of cations other than potassium.

Applicant argues that Nishida et al '265 discloses that sodium alginate or aluminum sulfate may be used as fixing agents, and that anionic surface-active agents may be used. Applicant further argues that the disclosed fixing agents and anionic surface active agents will generate cations other than potassium

While the broader disclosure of the invention of Nishida et al '265 embodies polymers comprising cations other than potassium upon necessity, the reference prefers, in view of moisture absorbing and desorbing rates, a ratio of potassium ions in of greater than 40%, more preferably greater than 60%. Each of the preferred ratios embodies using all potassium cations, which is disclosed as giving the best result. Nishida et al '265 also states that potassium type carboxyl groups are essential to the invention (col 4, lines 26-27). Nishida et al '265 further discusses the preference for potassium type carboxyl groups in col 3, line 65 to col 4, line 2. Obtaining the best result provides sufficient motive for one of ordinary skill in the art to use polymers having all carboxyl groups changed to potassium type.

It is also known in the art that polymers containing acid groups readily exchange cations (evidence of Lorah et al). One of ordinary skill in the art would realize that, due to the cation exchange ability, in order to maintain the disclosed polymers having all

potassium type carboxyl groups, other non-potassium cations should be prohibited or kept to a minimum in all aqueous environments involving the polymers, such as dispersions, emulsions, papermaking slurries, etc. One of ordinary skill would be motivated to avoid all non-potassium cations in aqueous dispersions, emulsions or slurries containing the polymers so that the final paper product has the best possible moisture absorption and desorption rates.

Regarding the possible use of fixing agents and surfactants, Nishida et al '265 recites examples of fixing agents that do not contribute non-potassium cations, e.g.- soluble starch, potassium alum. Nonionic surface-active agents are also specified (col 8, lines 30-36 and 41-43).

### *Response to Arguments*

Applicant's amendments, filed 5/14/2010, have overcome the rejection of Claim 11 under 35 U.S.C. 112, 1st paragraph. The rejection has been withdrawn.

However, upon further consideration and due to the amendments, a new rejection under 35 U.S.C. 112, 2nd paragraph is presented herein.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 4-9 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 11, as amended, recites the phrase, "to adhere the organic fine particles to the paper." It is not clear which portion of the claim is referenced by the phrase. Is the phrase a continuation of the preamble? Is the step wherein "paper comprising inorganic fiber and pulp-shaped fiber...is treated with an aqueous liquid..." intended to adhere the organic fine particles to the paper? Are the cross-linking structure of the particles and their acidic groups with associated bonded metal cations intended to adhere the organic fine particles to the paper? Is the concentration of cations in the water intended to adhere the organic fine particles to the paper?

Claims 1 and 4-9 depend from and inherit the indefiniteness of Claim 11.

This rejection can be overcome by amending the claim to recite, "wherein the organic fine particles adhere to the paper," or similar language.

***Claim Rejections - 35 USC § 103***

Claims 1 and 4-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belding et al (US 5791153) in view of Nishida (US 6429265) as evidenced by Lorah et al (US 2002/0055581).

Claims 1, 4-6 and 8-11: Belding et al discloses heat energy and moisture exchange or adsorbent media for use in air-conditioning and ventilating systems. The media comprises layers of absorbent paper having a desiccant incorporated within

during fabrication of the paper (thus the paper is impregnated with the desiccant) and/or coated on the formed paper. The desiccant can be any material capable of adsorbing moisture from an air stream and desorbing the moisture in a counter flowing air stream (Abs; col 2, lines 47-58; col 4, lines 64-67; col 5, lines 26-35 and 61-67; col 6, lines 1-9). In some embodiments, the absorbent paper is formed by a standard papermaking process comprising wet-laying the desiccant, inorganic fibers and fibrillated organic fibers (fibrillated acrylic fibers are preferred organic fibers) (col 7, lines 23-31, 39-45 and 53-55; col 8, lines 6-9 and 52-55). Wood pulp is also disclosed as a fiber source (col 9, line 1). Preparation of an aqueous slurry of the desiccant, inorganic fibers and fibrillated organic fibers is an inherent part of the wet-laying process. Thermally adhesive fibers are not required.

Belding et al does not disclose the claimed organic particles or the concentration of cations in the water used to make the paper or the coating. Belding et al also does not disclose the moisture absorbing rate, swelling rate and thermal shrinking rate of the paper.

Nishida '265 discloses particles of crosslinked acrylonitrile polymer (reads on fine particles having a crosslinking structure) capable of absorbing and releasing a high amount of moisture (removing moisture from air is discussed in the background section), the particles comprising, as an essential element, potassium salt type carboxyl groups (potassium bonded to the acidic groups) in an amount of 1.0-8.0 mmol/g. In some embodiments, the crosslinking of acrylonitrile groups is introduced by hydrazine and the acid salt groups are formed by hydrolysis of remaining nitrile groups by alkali

metal salts. The metals used can include Li, Na, K, Mg and Ca, although K is essential and the best result (moisture absorbing-desorbing rate) is obtained when all carboxyl groups are changed to potassium type (Abs; col 1, lines 5-14; col 2, lines 15-45; col 3, lines 23-32 and 65-67; col 4, lines 1, 2 and 26-45; col 6, lines 14-18, 29-53 and 65-67; col 7, lines 1-3). In some embodiments, the polymer is copolymerized with a crosslinking monomer such as divinylbenzene that reacts with a carboxyl group (col 5, line 53 to col 6, line 7).

Nishida '265 discloses making a paper by mixing the polymer particles in a dispersion of pulp and synthetic fiber (thus the particles are dispersed in water) and manufacturing paper using a conventional paper machine. Alternatively, a slurry of polymer particles is applied to a paper (col 8, lines 9-31).

Polymers containing acid groups are well known to exchange cations readily (for evidence, see Lorah et al, p 8, right column, lines 3-6).

The art of Belding et al, Nishida '265 and the instant invention is analogous as pertaining to moisture absorbing and desorbing compositions and paper comprising the compositions. It would have been obvious to one of ordinary skill in the art to use the claimed crosslinked acrylate particles as the desiccant in the adsorbent media of Belding et al in view of Nishida '265 as a functionally equivalent material having been disclosed for the purpose. The disclosure of Nishida et al '265 along with the knowledge that polymers containing acid groups readily exchange cations (Lorah et al) provide sufficient motive to one of ordinary skill in the art to optimize the moisture absorbing and desorbing properties of the paper by using, in the manufacture of the

paper, water or an aqueous slurry having no more than the the claimed amount of non-potassium cations to obtain the maximum number of potassium type carboxyl groups in the polymer and to avoid exchange of the essential potassium with other cations. It would also have been obvious to obtain the claimed moisture absorbing rate, swelling rate and thermal shrinking rate in the paper as the structure of the paper so made is substantially the same as the claimed paper. It would have further been obvious that the desiccant particles adhere to the paper in order to provide the moisture absorbing and desorbing properties in the paper.

Claims 7 and 12: Belding et al discloses that the paper comprises an amount of desiccant from 5 to 85% by weight, the remainder comprising fibrous material (col 8, lines 64-67). Belding et al further discloses synthetic organic fibers can include polyethylene, polypropylene, polyester and polyamide fibers (col 7, lines 39-45), which are thermally adhesive fibers. Belding et al also discloses that the amount of fibrillated fibers and non-fibrillated inorganic and organic fibers can be adjusted to suit the particular need (col 7, lines 32-35). Thus, the fiber mix is a result effective variable and, absent a showing of unobvious results commensurate in scope with the claims, the claimed amounts of fibers would have been determined by one of ordinary skill in the art by routine experimentation.

Claims 1, 4 and 6-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belding et al (US 5791153) in view of Tanaka et al (US 5691421) and further in view of Nishida ('265) and as evidenced by Lorah et al.

The disclosure and deficiencies of Belding et al are used as above.

Tanaka et al discloses particles of crosslinked acrylonitrile polymer capable of absorbing and releasing a large amount of moisture (removing moisture from air is discussed in the background section), the particles comprising salt type carboxyl groups in an amount of 1 mmol/g (Abs; col 1, lines 1-15 and 41-60). In some embodiments, the crosslinking of acrylonitrile groups is introduced by hydrazine and the acid salt groups are formed by hydrolysis of remaining nitrile groups by alkali metal salts. The metals used include Li, Na, K, Mg and Ca (col 1, line 65 to col 2, line 65).

Tanaka et al discloses a moisture absorption of 17 to 48% at 20 °C/65% RH (col 4, lines 10-20, Example 1, Table 1; col 6, lines 44 and 45). The particles can be added to any material and are used in any field where moisture absorption and desorption are required (col 7, line 20 to col 8, line 4).

Tanaka et al does not disclose the claimed concentration of cations in the water used to make the paper or the coating. Tanaka et al also does not disclose the claimed swelling rate and thermal shrinking rate of the paper.

The disclosure of Nishida ('265) and evidence of Lorah et al are used as above.

The art of Belding et al, Tanaka et al, Nishida ('265) and the instant invention is analogous as pertaining to moisture absorbing and desorbing compositions and substrates comprising the compositions. It would have been obvious to one of ordinary skill in the art to use the claimed crosslinked acrylate particles in the form of potassium salt groups as the desiccant in the adsorbent paper of Belding et al in view of Tanaka et al and further in view of Nishida ('265) as a functionally equivalent material having been

disclosed for the purpose. The teachings of Nishida et al '265 along with the knowledge that polymers containing acid groups readily exchange cations (Lorah et al) provide sufficient motive to one of ordinary skill in the art to optimize the moisture absorbing properties of the paper by using, in the manufacture of the paper, water having no more than the the claimed amount of non-potassium cations to obtain the maximum number of potassium type carboxyl groups in the polymer and to avoid exchange of potassium with other cations. It would also have been obvious to obtain the claimed swelling rate and thermal shrinking rate in the paper as the structure of the paper so made is substantially the same as the claimed paper. It would have further been obvious that the desiccant particles adhere to the paper in order to provide the moisture absorbing and desorbing properties in the paper.

Claims 1 and 4-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belding et in view of Nishida (US 6080797 or US 6387970) and further in view of Nishida ('265) and as evidenced by Lorah et al.

The disclosure and deficiencies of Belding et al are used as above.

Nishida ('797) discloses particles of crosslinked acrylonitrile polymer capable of absorbing and releasing a large amount of moisture (removing moisture from air is discussed in the background section), the particles comprising salt type carboxyl groups in an amount of 2.0-12.0 mmol/g. In some embodiments, the crosslinking of acrylonitrile groups is introduced by hydrazine and the acid salt groups are formed by hydrolysis of remaining nitrile groups by alkali metal salts. The metals used include Li, Na, K, Mg

and Ca (Abs; col 1, lines 1-14; col 2, lines 19-67; col 3, lines 1 and 31-36; col 3, line 64 to col 4, line 21). In other embodiments, the polymer is copolymerized with a crosslinking monomer such as divinylbenzene that reacts with a carboxyl group (col 5, lines 26-46).

Nishida ('797) discloses making a paper by adding the polymer particles to a dispersion of pulp and synthetic fiber and manufacturing paper using a conventional paper machine. Alternatively, a slurry of polymer particles are applied to a paper (col 10, lines 37-56).

Nishida ('970) is a division of Nishida ('797), has the same disclosure.

Nishida ('797 and '970) do not disclose the claimed concentration of cations in the water used to make the paper or the coating. Nishida ('797 and '970) also do not disclose the claimed moisture absorbing rate, swelling rate and thermal shrinking rate of the paper

The disclosure of Nishida ('265) and evidence of Lorah et al are used as above.

The art of Belding et al, Nishida ('797 or '970), Nishida ('265) and the instant invention is analogous as pertaining to moisture absorbing and desorbing compositions and paper comprising the compositions. It would have been obvious to one of ordinary skill in the art to use the claimed crosslinked acrylate particles in the form of potassium salt groups as the desiccant in the adsorbent media of Belding et al in view of Nishida ('797 or '970) and further in view of Nishida ('265) and as evidenced by Lorah et al as a functionally equivalent material having been disclosed for the purpose. The teachings of Nishida et al '265 along with the knowledge that polymers containing acid groups

readily exchange cations (Lorah et al) provide sufficient motive to one of ordinary skill in the art to optimize the moisture absorbing properties of the paper by using, in the manufacture of the paper, water having no more than the the claimed amount of non-potassium cations to obtain the maximum number of potassium type carboxyl groups in the polymer and to avoid exchange of potassium with other cations. It would also have been obvious to obtain the claimed moisture absorbing rate, swelling rate and thermal shrinking rate in the paper as the structure of the paper so made is substantially the same as the claimed paper. It would have further been obvious that the desiccant particles adhere to the paper in order to provide the moisture absorbing and desorbing properties in the paper.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DENNIS CORDRAY whose telephone number is (571)272-8244. The examiner can normally be reached on M - F, 7:30 -4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Daniels can be reached on 571-272-2450. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Dennis Cordray/
Examiner, Art Unit 1741

/Matthew J. Daniels/

Supervisory Patent Examiner, Art Unit 1741